

We claim:

1. A method for permitting efficient trading of shares of a fund without revealing the fund assets, comprising:
  - determining a set of risk factors from a risk factor model,
  - 5 receiving a set of fund sensitivity coefficients and storing the set of fund sensitivity coefficients on computer readable media, wherein each fund sensitivity coefficient specifies the exposure of the fund to one of the risk factors, and
    - using computer means to create a proxy portfolio having substantially the same sensitivity coefficients as the fund.
- 10 2. The method of claim 1, further comprising:
  - calculating an estimated value for the fund based on the value of the proxy portfolio, wherein the step of calculating the estimated value is repeated periodically throughout a trading period, and
    - publishing the estimated value periodically throughout the trading period.
- 15 3. The method of claim 1, further comprising:
  - creating a hedging portfolio, wherein the hedging portfolio has substantially the same sensitivity coefficients as the fund.
4. The method of claim 1, wherein the risk factor model is an economic risk factor model.
5. The method of claim 4, wherein at least one risk factor is selected from the group of risk  
20 factors consisting of: unexpected changes in default premiums, unexpected interest rate changes, unexpected changes in inflation rates, unexpected changes in long term economic growth, market risk as measured by a benchmark index, unexpected changes in debt term structure, risk premium, firm size effects, leverage, and book-to-market equity.

6. The method of claim 1, wherein the risk factor model is a statistical risk factor model.
7. The method of claim 3, wherein the risk factor model is a statistical risk factor model.
8. The method of claim 3, wherein the risk factor model is an economic risk factor model.
9. The method of claim 6, wherein the risk factor model is a principal components analysis.
- 5 10. The method of claim 1, further comprising the step of selecting securities for a proxy universe, wherein the step of creating a proxy portfolio involves calculating weights of securities in the proxy universe.
11. The method of claim 10, wherein the risk factors are calculated by orthogonalizing a correlation matrix of returns functions of the securities in the proxy universe.
- 10 12. The method of claim 11, wherein the step of measuring the exposure of the fund to the set of risk factors includes a linear least squares regression.
13. The method of claim 12, further comprising the steps of:  
    sorting the securities in the proxy universe into a plurality of groups,  
    creating a correlation matrix of returns functions of the securities in each group of  
15 securities, thereby creating a correlation matrix for each group,  
    orthogonalizing the correlation matrix for each group to produce a first set of eigenvalues and corresponding eigenvectors for each group,  
    arranging the first set of eigenvalues for each group in descending order,  
    eliminating a number of the smallest eigenvalues from the first set of eigenvalues and  
20 their corresponding eigenvectors from each group according to predetermined elimination criteria to produce a reduced set of principal components for each group,

creating a correlation matrix between all of the principal components in the reduced set of principal components for each group,

orthogonalizing the correlation matrix between all of the principal components in the reduced set of principal components for each group to produce a second set of eigenvalues and

5 corresponding eigenvectors for all reduced groups,

eliminating a number of the smallest eigenvalues and their corresponding eigenvectors from the second set of eigenvalues and corresponding eigenvectors to produce a set of risk factors.

14. A method for creating a proxy portfolio for a fund without revealing the fund assets,  
10 comprising the steps of:

measuring an exposure of the fund to a set of risk factors to produce a set of fund sensitivity coefficients, wherein the risk factors comprise a historical time series of price data for a set of securities and each fund sensitivity coefficient indicates the exposure of the fund to one of the risk factors,

15 storing the fund sensitivity coefficients on computer readable media; and

using computer means to create a proxy portfolio from securities selected from a proxy universe of securities, wherein the proxy portfolio has substantially the same sensitivity coefficients as the fund.

15. A method for creating a hedging portfolio for a fund without revealing the fund assets,  
20 comprising the steps of:

measuring an exposure of the fund to a set of risk factors to produce a set of fund sensitivity coefficients, wherein the risk factors comprise a historical time series of price data for a set of securities and each fund sensitivity coefficient indicates the exposure of the fund to one of the risk factors;

storing the fund sensitivity coefficients on computer readable media;

using computer means to create a proxy portfolio from securities selected from a proxy universe of securities, wherein the proxy portfolio has substantially the same sensitivity coefficients as the fund; and

5 using computer means to create a hedging portfolio based on the proxy portfolio.

16. A method for creating a reduced risk hedging portfolio for a fund without revealing the fund assets, comprising the steps of:

measuring an exposure of the fund to a plurality of risk factors to produce a set of fund sensitivity coefficients, wherein the risk factors comprise a historical time series of price data for

10 a set of securities;

storing the fund sensitivity coefficients on computer readable media;

using computer means to measure an exposure of each security in a set of securities in a hedging universe to each of the risk factors; and

15 using computer means programmed with risk minimizer software to produce a reduced risk hedging portfolio with substantially the same returns and risk as the fund.

17. A system for permitting efficient trading of shares of a fund without revealing the fund assets, comprising:

computer means programmed to determine a set of risk factors from a risk factor model,

20 a network through which the computer means receives a set of fund sensitivity coefficients, wherein each fund sensitivity coefficient specifies the exposure of the fund to one of the risk factors,

wherein the computer means creates a proxy portfolio with substantially the same sensitivity coefficients as the fund.

18. The system of claim 17, wherein the computer means calculates an estimated value for the fund based on the value of the proxy portfolio periodically throughout a trading period and transmits the estimated value through the network to publish the estimated value periodically throughout the trading period.
- 5 19. The system of claim 17, wherein the computer means creates a hedging portfolio with substantially the same sensitivity coefficients as the fund.
20. The system of claim 17, wherein the risk factor model is an economic risk factor model.
21. The system of claim 20, wherein at least one risk factor is selected from the group of risk factors consisting of: unexpected changes in default premiums, unexpected interest rate changes,  
10 unexpected changes in inflation rates, unexpected changes in long term economic growth, market risk as measured by a benchmark index, unexpected changes in debt term structure, risk premium, firm size effects, leverage, and book-to-market equity.
22. The system of claim 17, wherein the risk factor model is a statistical risk factor model.
23. The system of claim 19, wherein the risk factor model is a statistical risk factor model.
- 15 24. The system of claim 22, wherein the risk factor model is a principal components analysis.
25. The system of claim 17, wherein the computer means creates a proxy portfolio by calculating weights of securities in a proxy universe.
26. The system of claim 22, wherein the risk factors are calculated by orthogonalizing a correlation matrix of returns functions of the securities in the proxy universe.
- 20 27. The system of claim 26, wherein the computer means measures the exposure of the fund to the set of risk factors by a linear least squares regression.

28. The system of claim 27, wherein the computer means is programmed to:  
sort the securities in the proxy universe into a plurality of groups,  
create a correlation matrix of returns functions of the securities in each group of securities, thereby creating a correlation matrix for each group,

5 orthogonalize the correlation matrix for each group to produce a first set of eigenvalues and corresponding eigenvectors for each group,

arrange the first set of eigenvalues for each group in descending order,

eliminate a number of the smallest eigenvalues from the first set of eigenvalues and their corresponding eigenvectors from each group according to predetermined elimination criteria to

10 produce a reduced set of principal components for each group,

create a correlation matrix between all of the principal components in the reduced set of eigenvectors for each group,

orthogonalize the correlation matrix between all of the principal components in the reduced set of principal components for each group to produce a second set of eigenvalues and

15 corresponding eigenvectors for all reduced groups, and

eliminate a number of the smallest eigenvalues and their corresponding eigenvectors from the second set of eigenvalues and corresponding eigenvectors to produce a set of risk factors.

29. A system for creating a proxy portfolio for a fund comprising:

computer means programmed to measure an exposure of the fund to a set of risk factors

20 to produce a set of fund sensitivity coefficients, wherein the risk factors comprise a historical time series of price data for a set of securities and each fund sensitivity coefficient indicates the exposure of the fund to one of the risk factors,

the computer means further programmed to create a proxy portfolio from securities selected from a proxy universe of securities, wherein the proxy portfolio has substantially the

25 same sensitivity coefficients as the fund.

30. A system for creating a hedging portfolio for a fund comprising:

computer means programmed to measure an exposure of the fund to a set of risk factors to produce a set of fund sensitivity coefficients, wherein the risk factors comprise a historical time series of price data for a set of securities and each fund sensitivity coefficient indicates the exposure of the fund to one of the risk factors;

the computer means further programmed to create a proxy portfolio from securities selected from a proxy universe of securities, wherein the proxy portfolio has substantially the same sensitivity coefficients as the fund; and

the computer means further programmed to create a hedging portfolio based on the proxy portfolio.

31. A system for creating a reduced risk hedging portfolio for a fund comprising:

computer means programmed to measure an exposure of the fund to a plurality of risk factors to produce a set of fund sensitivity coefficients, wherein the risk factors comprise a historical time series of price data for a set of securities,

the computer means further programmed to measure an exposure of each security in a set of securities in a hedging universe to each of the risk factors; and

the computer means further programmed with risk minimizer software to produce a reduced risk hedging portfolio with substantially the same returns and risk as the fund.

32. The system of claim 29, wherein the computer is further programmed with a graphical user interface, including a graphical dial, slide bar, or other graphical indicator for adjusting user inputs, wherein the user inputs are selected from the group consisting of the size of aggregation buckets, database minimum data density requirements, banding time, the number of returns used to build the model, the type of weighting, the percent variation used for eigenvalue and factor culling, and the total number of factors to be used in the model.

33. A data storage device storing software to permit efficient trading of shares of a fund without revealing the fund assets, the software having instructions for causing computer means to execute the steps of:

determining a set of risk factors from a risk factor model,

5 receiving a set of fund sensitivity coefficients, wherein each fund sensitivity coefficient specifies the exposure of the fund to one of the risk factors, and

creating a proxy portfolio, wherein the proxy portfolio has substantially the same sensitivity coefficients as the fund.

10 34. The data storage device of claim 33, the software on the data storage device further having instructions for causing computer means to execute the steps of:

calculating an estimated value for the fund based on the value of the proxy portfolio, wherein the step of calculating the estimated value is repeated periodically throughout a trading period, and

publishing the estimated value periodically throughout the trading period.

15 35. The data storage device of claim 33, the software on the data storage device further having instructions for causing computer means to execute the steps of:

creating a hedging portfolio, wherein the hedging portfolio has substantially the same sensitivity coefficients as the fund.

20 36. The data storage device of claim 33, wherein the risk factor model is an economic risk factor model.

37. The data storage device of claim 36, wherein at least one risk factor is selected from the group of risk factors consisting of: unexpected changes in default premiums, unexpected interest rate changes, unexpected changes in inflation rates, unexpected changes in long term economic



growth, market risk as measured by a benchmark index, unexpected changes in debt term structure, risk premium, firm size effects, leverage, and book-to-market equity.

38. The data storage device of claim 33, wherein the risk factor model is a statistical risk factor model.

5 39. The data storage device of claim 35, wherein the risk factor model is a statistical risk factor model.

40. The data storage device of claim 38, wherein the risk factor model is a principal components analysis.

41. The data storage device of claim 33, the software on the data storage device further  
10 having instructions for causing computer means to execute the step of selecting securities for a proxy universe, wherein the step of creating a proxy portfolio involves calculating weights of securities in the proxy universe.

42. The data storage device of claim 41, wherein the risk factors are calculated by orthogonalizing a correlation matrix of returns functions of the securities in the proxy universe.

15 43. The data storage device of claim 42, wherein the step of measuring the exposure of the fund to the set of risk factors includes a linear least squares regression.

44. The data storage device of claim 43, the software on the data storage device further having instructions for causing a computer to execute the steps of:

sorting the securities in the proxy universe into a plurality of groups,

20 creating a correlation matrix of returns functions of the securities in each group of securities, thereby creating a correlation matrix for each group,

orthogonalizing the correlation matrix for each group to produce a first set of eigenvalues and corresponding eigenvectors for each group,

arranging the first set of eigenvalues for each group in descending order,

eliminating a number of the smallest eigenvalues from the first set of eigenvalues and

5 their corresponding eigenvectors from each group according to predetermined elimination criteria to produce a reduced set of principal components for each group,

creating a correlation matrix between all of the principal components in the reduced set of principal components for each group,

10 orthogonalizing the correlation matrix between all of the principal components in the reduced set of principal components for each group to produce a second set of eigenvalues and corresponding eigenvectors for all reduced groups,

eliminating a number of the smallest eigenvalues and their corresponding eigenvectors from the second set of eigenvalues and corresponding eigenvectors to produce a set of risk factors.

15 45. A data storage device storing software to create a proxy portfolio for a fund without revealing the fund assets, the software having instructions for causing computer means to execute the steps of:

measuring an exposure of the fund to a set of risk factors to produce a set of fund sensitivity coefficients, wherein the risk factors comprise a historical time series of price data for  
20 a set of securities and each fund sensitivity coefficient indicates the exposure of the fund to one of the risk factors,

creating a proxy portfolio from securities selected from a proxy universe of securities, wherein the proxy portfolio has substantially the same sensitivity coefficients as the fund.

46. A data storage device storing software to create a hedging portfolio for a fund without revealing the fund assets, the software having instructions for causing computer means to execute the steps of:

measuring an exposure of the fund to a plurality of risk factors to produce a set of fund  
5 sensitivity coefficients, wherein the risk factors comprise a historical time series of price data for a set of securities,

measuring an exposure of each security in a set of securities in a hedging universe to each  
of the risk factors; and

producing a reduced risk hedging portfolio with substantially the same returns and risk as  
10 the fund.

47. A method for permitting efficient trading of shares of a fund without revealing the fund assets, comprising:

receiving or calculating a set of risk factors from a risk factor model,

storing the set of risk factors on computer readable media, and

15 using computer means to calculate a set of fund sensitivity coefficients, wherein each fund sensitivity coefficient specifies the exposure of the fund to one of the risk factors.

48. A method for permitting efficient trading of shares of a fund without revealing the fund assets, comprising:

using computer means to create a proxy portfolio from a set of fund sensitivity  
20 coefficients, wherein each fund sensitivity coefficient specifies the exposure of the fund to a risk factor.

49. The method of claim 48, further comprising:

calculating an estimated value for the fund based on the value of a proxy portfolio, wherein the step of calculating the estimated value is repeated periodically throughout a trading period, and

publishing the estimated value periodically throughout the trading period.

5    50.    The method of claim 47, further comprising:

creating a hedging portfolio, wherein the hedging portfolio has substantially the same sensitivity coefficients as the fund.

51.    The method of claim 47, wherein the risk factor model is an economic risk factor model.

52.    The method of claim 47, wherein the risk factor model is a statistical risk factor model.

10    53.    The method of claim 52, wherein the risk factor model is a principal components analysis.

54.    A method for permitting efficient trading of shares of a fund without revealing the fund assets, comprising the steps:

sorting securities in a proxy universe into a plurality of groups,

15    creating a correlation matrix of returns functions of the securities in each group of securities, thereby creating a correlation matrix for each group,

using computer means to orthogonalize the correlation matrix for each group to produce a first set of eigenvalues and corresponding eigenvectors for each group,

arranging the first set of eigenvalues for each group in descending order,

20    eliminating a number of the smallest eigenvalues from the first set of eigenvalues and their corresponding eigenvectors from each group according to predetermined elimination criteria to produce a reduced set of principal components for each group,

creating a correlation matrix between all of the principal components in the reduced set of principal components for each group,

using the computer means to orthogonalize the correlation matrix between all of the principal components in the reduced set of principal components for each group to produce a  
5 second set of eigenvalues and corresponding eigenvectors for all reduced groups,

eliminating a number of the smallest eigenvalues and their corresponding eigenvectors from the second set of eigenvalues and corresponding eigenvectors to produce a set of risk factors.

55. A method for permitting efficient trading of shares of a fund without revealing the fund  
10 assets, comprising the steps of:

receiving a set of fund sensitivity coefficients indicating the exposure of the fund to a set of risk factors;

storing the set of fund sensitivity coefficients on computer readable media; and

using computer means to create a proxy portfolio from securities selected from a proxy  
15 universe of securities, wherein the proxy portfolio has substantially the same sensitivity coefficients as the fund.

56. An exchange traded fund whose assets are not publicly disclosed on a daily basis, wherein an estimated value of the fund is calculated by:

determining a set of risk factors from a risk factor model;

20 determining a set of fund sensitivity coefficients and storing the set of fund sensitivity coefficients on computer readable media, wherein each fund sensitivity coefficient specifies the exposure of the fund to one of the risk factors;

storing the fund sensitivity coefficients on computer readable media;

using computer means to create a proxy portfolio having substantially the same sensitivity coefficients as the fund; and

calculating the estimated value of the fund based on the value of the proxy portfolio.

57. A method for calculating an estimated value for an exchange traded fund without publicly disclosing the assets of the exchange traded fund, comprising:

determining a set of risk factors from a risk factor model;

receiving or calculating a set of fund sensitivity coefficients, wherein each fund sensitivity coefficient specifies the exposure of the fund to one of the risk factors;

using computer means to create a proxy portfolio with substantially the same sensitivity coefficients as the fund;

using computer means to calculate the estimated value for the fund based on the value of the proxy portfolio.

58. The method of claim 57, further comprising the step of disseminating the estimated value for the fund periodically throughout the day.

59. A method comprising trading shares of a fund without revealing the fund assets, wherein an estimated value for the fund is derived from a method comprising:

determining a set of risk factors from a risk factor model;

determining or receiving a set of fund sensitivity coefficients and storing the set of fund sensitivity coefficients on computer readable media, wherein each fund sensitivity coefficient specifies the exposure of the fund to one of the risk factors;

storing the fund sensitivity coefficients on computer readable media;

using computer means to create a proxy portfolio having substantially the same sensitivity coefficients as the fund; and

calculating the estimated value of the fund based on the value of the proxy portfolio.

60. A method for permitting efficient trading of shares of a fund without revealing the fund assets, comprising:

determining a set of risk factors from a risk factor model,

receiving a set of fund sensitivity coefficients and storing the set of fund sensitivity

5 coefficients on computer readable media, wherein each fund sensitivity coefficient specifies the exposure of the fund to one of the risk factors,

using computer means to create a proxy portfolio having substantially the same sensitivity coefficients as the fund,

calculating an estimated value for the fund based on the value of the proxy portfolio,

10 wherein the step of calculating the estimated value is repeated periodically throughout a trading period, and

publishing the estimated value periodically throughout the trading period.

61. A method for permitting efficient trading of shares of a fund without revealing the fund assets, comprising:

15 determining a set of risk factors from a risk factor model,

receiving a set of fund sensitivity coefficients and storing the set of fund sensitivity coefficients on computer readable media, wherein each fund sensitivity coefficient specifies the exposure of the fund to one of the risk factors,

using computer means to create a proxy portfolio having substantially the same sensitivity

20 coefficients as the fund, and

creating a hedging portfolio, wherein the hedging portfolio has substantially the same sensitivity coefficients as the fund.

62. A method comprising using computer means to select a second set of securities that substantially tracks the returns of a first set of securities over the course of a trading day, wherein

the second set of securities serves as a proxy for the first set of securities and market participants use the second set of securities to price the first set of securities without knowing the composition of the first set of securities.

63. The method of claim 62, wherein the computer uses a Monte Carlo method to select the  
5 second set of securities.

64. The method of claim 62, wherein the computer uses a risk factor method to select the second set of securities.

65. The method of claim 64, wherein the risk factor method is an economic risk factor method.

10 66. The method of claim 64, wherein the risk factor method is a statistical risk factor method.

67. A method comprising using computer means to select a second set of securities that substantially tracks the returns of a first set of securities over the course of a trading day, wherein market participants use the second set of securities to hedge a position in the first set of securities without knowing the composition of the first set of securities.

15 68. The method of claim 67, wherein the computer uses a Monte Carlo method to select the second set of securities.

69. The method of claim 67, wherein the computer uses a risk factor method to select the second set of securities.

20 70. The method of claim 69, wherein the risk factor method is an economic risk factor method.

71. The method of claim 69, wherein the risk factor method is a statistical risk factor method.



72. The method of claim 67, wherein the second set of securities is a hedging portfolio derived from a proxy portfolio generated by a computer means to substantially track the returns of the first set of securities.

73. An option or derivative instrument based on an exchange traded fund whose assets are  
5 not publicly disclosed on a daily basis, wherein an estimated value of the fund is calculated by:

determining a set of risk factors from a risk factor model;

determining a set of fund sensitivity coefficients and storing the set of fund sensitivity coefficients on computer readable media, wherein each fund sensitivity coefficient specifies the exposure of the fund to one of the risk factors;

10 storing the fund sensitivity coefficients on computer readable media;

using computer means to create a proxy portfolio having substantially the same sensitivity coefficients as the fund; and

calculating the estimated value of the fund based on the value of the proxy portfolio.